



Original Article

Assessment of perceived stress and association with sleep quality and attributed stressors among 1st-year medical students: A cross-sectional study from karwar, Karnataka, India

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ABSTRACT

Objectives: The objective is to study the extent of perceived stress among 1st-year medical students using the Perceived Stress Scale-14 (PSS-14) and its association with sleep quality as assessed by the Pittsburgh Sleep Quality Index (PSQI) and attributed stressors. **Materials and Methods:** A cross-sectional study was conducted of 121 1st-year medical students at Karwar Institute of Medical Sciences, Karwar, Karnataka, India. The extent of their stress was assessed using the PSS-14 and their sleep quality was assessed using the PSQI. Graded stress exerted by the attributed stressors was also assessed. **Results:** A total of 33.8% of participants had perceived stress scores of >28. Among academic stressors, performance in examinations (34.7%), lack of time for recreation (30.6%), curriculum (24.8%), and frequency of examinations (24.8%) were the highest rated stressors. Quality of food in the mess (50.4%) and lack of entertainment in the institution (39.7%) were the highest rated psychosocial stressors. There was a positive correlation between the PSS-14 scores and various academic stressors and the global PSQI score. **Conclusion:** First-year medical students reported a high level of stress, including academic and psychosocial stressors. Effective changes in the curriculum and living conditions can reduce the level of stress among these students.

KEYWORDS: *Perceived stress, Sleep quality, Stressors*

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INTRODUCTION

Inability to cope with goals and responsibilities often leads to stress. Stresses in day-to-day life can be seen in neurological and physiological reactions when adapting to new conditions [1].

Personal and environmental events which induce stress are called as stressors [2-4]. Numerous stressors can impact the well-being of students in medical school. Apart from coping with day-to-day stressors, medical students should deal with stressors specific to medical school in terms of the heavy curriculum which should be covered within a stipulated duration, long working hours, lack of recreation, separation from family, financial concerns, and competition with peers.

High levels of stress can have negative impacts on the cognition and comprehension of medical students [5]. They can suppress and inhibit learning and in turn affect academic performance. Studies worldwide have reported a prevalence of stress among medical students from 27% to 73% [6]. This stress could lead to anxiety, depression [7,8], suicidal thoughts [9], interpersonal conflicts [10], sleep disturbances [11], poor

academic and clinical performance [12], and alcohol and substance abuse [13].

The right amount of stress can be a helpful, positive force. However, too much stress can lead to tension and anxiety and can cause sleep problems. First-year medical students begin their careers unaware and unprepared to cope with the challenges of the profession. If high levels of unwanted stress are not properly managed, their health and sense of well-being can suffer. Hence, there is a need to create a compassionate and stress-free competitive environment within the campus to avoid consequences such as depression, sleep problems, tension, anxiety, work mistakes, poor concentration, and apathy. The extent of perceived stress, its association with sleep quality, and the attributed stressors among 1st-year medical students were explored in this study.

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Aims and objectives

The aim of the study is to assess the perceived stress among 1st-year medical students using the Perceived Stress Scale-14 (PSS-14) and its association with sleep quality as assessed using the Pittsburg sleep quality index and the attributed stressors.

MATERIALS AND METHODS

Study design

A cross-sectional study was conducted of 1st-year medical students. The study was reviewed and approved by the Institution Ethics Committee (KAIMS/IEC/20/2016).

Sample size

The study included all new medical students. Of 150 students in the study population, the sample size required was 108 with a confidence interval of 95% and a margin of error of 5.0%.

Study period

The study was done in December 2016. This period was chosen because the students had entered the professional course 2–3 months earlier on September 1, 2016. During this time, the students were not only exposed to various academic stressors but also psychosocial and health-related stressors.

Study setting

This study was conducted in Karwar Institute of Medical Sciences, Karwar, Karnataka, India. The intention of the study was explained to the students and they were assured that their identity would not be disclosed. Participants who volunteered and gave informed written consent were included in the study. Of 150 1st-year medical students, 121 volunteered and gave consent to participate (response rate – 80.67%). Six of the volunteer participants were day-scholars and the remaining 115 participants stayed in the student hostel.

Study tool

The sociodemographic profile of the participants was recorded. The extent of perceived stress was assessed using the PSS-14. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI). Grading of stress exerted by the attributed stressors was also assessed. Attributed stressors were compiled based on previous studies.

Data collection

All participants assembled in a lecture hall on December 21, 2016, in the morning. The questionnaires consisting of a sociodemographic profile, the PSS-14, the PSQI, and a list of potential stressors graded with a Likert scale were distributed to the participants. The contents were explained initially by one of the authors. Questions were addressed individually by the other authors. Adequate time was given to complete the questionnaires. The students were asked not to discuss the contents among themselves and were asked to mark the questionnaires appropriately.

Perceived Stress Scale-14

The PSS-14 is a self-rated questionnaire to measure perceived stress, consisting of 7 positively stated and 7 negatively stated items [14]. The negatively stated items are reverse

scored and then summed with the scores of the positively stated items to get the total score for perceived stress. The scores range from 0 to 56, with higher scores indicating higher levels of stress. This scale has an internal consistency score of Cronbach's α 0.85 with a test–retest reliability of 0.85 after 1 week. The PSS-14 scores were divided into stratified quartiles. The upper two and lower two quartiles were combined, with 28 being the operational cutoff value for stressed and not stressed conditions. This cutoff value was selected in accordance to with an earlier study [15]. In this study, the test–retest reliability of the PSS-14 was 0.84.

Pittsburgh Sleep Quality Index

The PSQI is a self-rated questionnaire consisting of 19 questions used to assess 7 components of sleep – subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, usage of sleep medication, and daytime dysfunction during the previous month [16]. Each question on the questionnaire is scored from 0 to 3, with 0 being the highest and 3 being the lowest score. The seven component scores are then added to get a global PSQI score in the range of 0–21. A global score ≥ 5 indicates poor sleep quality in the past month. The PSQI is reliable with a Cronbach's α of 0.83. In this study, the PSQI had an internal consistency of 0.82.

Potential stressors

Potential stressors were compiled based on earlier studies done by Shah *et al.* and Sreeramareddy *et al.* [15,17]. A total of 29 stressors were included in the list. They were categorized into academic, psychosocial, and health-related stressors as opined by the psychiatrist and psychologist. The severity of stress for each stressor was scored ranging from 1 to 5 on a Likert scale. The scoring of these stressors had an internal consistency of 0.85 after 1 week in this study.

Statistical analysis

The data were compiled in Microsoft Excel and analyzed with appropriate statistical tests using Microsoft Excel 2010 (provided by Microsoft) and SPSS 11 software (provided by SPSS Inc., Chicago, Illinois, USA) Student's unpaired *t*-test was applied for comparison between subgroups. Spearman's rank correlation test was applied for correlation between stressors and the PSS-14 score and between the PSS-14 and PSQI scores.

RESULTS

A total of 69 participants were included in the study of which 17 were men and 52 were women. They were 18.37 ± 0.8 years old with ages ranging from 17 to 19 years.

The PSS-14 scores are noted in Table 1. The mean PSS-14 score was 26.55 ± 5.4 . A total of 33.8% had PSS-14 scores >28 . Although the prevalence of PSS-14 scores >28 and the mean PSS-14 score were higher in men, the gender difference was statistically insignificant.

The severity of stress felt from various stressors is noted in Table 2. The highest rated academic stressors were performance in examinations (34.7%), lack of time for recreation (30.6%), curriculum (24.8%), and frequency of examinations (24.8%). The highest rated psychosocial stressors were quality of

food in the mess (50.4%) and lack of entertainment in the institution (39.7%).

In the subgroup with PSS-14 scores ≤ 28 , frequency of examinations (25%), performance in examinations (25%), and lack of time for recreation (23.8%) were the highest rated academic stressors; quality of food in the mess (46.3) and lack of entertainment in the institution (31.3%) were the highest rated psychosocial stressors.

In the subgroup with PSS-14 score > 28 , performance in

examinations (53.7%), lack of time for recreation (43.9%), curriculum (36.6%), lack of special guidance from faculty (31.7%), competition with peers (29.3%), and frequency of examinations (24.4%) were the higher rated academic stressors; dissatisfaction with class lectures (29.3%); quality of food in the mess (58.5%), lack of entertainment in the institution (56.1%), difficulty in getting back home (34.1%), and high parental expectations (24.4%) were the highest rated psychosocial stressors; nutrition (26.8%) and lack of exercise (24.4%) were the highest rated health-related stressors.

Correlations between the severity of stress felt by various stressors and PSS-14 scores among participants are noted in Table 3. There were positive correlations between the PSS-14 score and various potential academic, psychosocial, and health-related stressors, including performance in examinations, dissatisfaction with class lectures, nonavailability of adequate learning materials, lack of time for recreation, competition with peers, academic curriculum, financial strain, loneliness, lack of entertainment in the institution, living conditions in the hostel, high parental expectations, and class attendance.

Table 1: Perceived Stress Scale-14 scores

PSS-14 score	Study group (n=121), n (%)	Subgroups	
		Men (69), n (%)	Women (52), n (%)
0-14	2 (1.7)	2 (2.8)	0
15-28	78 (64.5)	40 (58)	38 (73.1)
29-42	40 (33)	26 (37.7)	14 (26.9)
43-56	1 (0.8)	1 (1.4)	0
Mean PSS-14 score	26.55 \pm 5.4	26.93 \pm 5.92	26.04 \pm 4.64

Student's unpaired *t*-test between gender subgroups *P*=0.18. PSS-14: Perceived Stress Scale-14

Table 2: Severity of stress from various stressors

Stressors	Percentage of participants with stress score > 3		
	Study group (n=121)	Subgroup with PSS-14 score > 28 (n=41)	Subgroup with PSS-14 score ≤ 28 (n=80)
Academic			
Frequency of examinations	24.8	24.4	25
Performance in examinations	34.7	53.7	25
Academic curriculum	24.8	36.6	18.8
Dissatisfaction with class lectures	18.2	29.3	12.5
Nonavailability of adequate learning materials	5	9.8	2.5
Becoming a doctor	20.7	22	20
Lack of time for recreation	30.6	43.9	23.8
Competition with peers	16.5	29.3	10
Lack of special guidance from faculty	20.7	31.7	15
Class attendance	7.4	9.8	6.3
Difficulty reading textbooks	12.4	12.2	12.5
Psychosocial			
High parental expectations	20.7	24.4	18.8
Loneliness	12.4	17.1	10
Family problems	4.1	4.9	3.8
Accommodation away from home	9.9	12.2	8.8
Political situation in the country	2.5	4.9	1.3
Relations with opposite sex	3.3	4.9	2.5
Lack of entertainment in the institution	39.7	56.1	31.3
Difficulty in getting back home	24.8	34.1	20
Quality of food in the mess	50.4	58.5	46.3
Financial strain	11.6	12.2	11.3
Inability to socialize with peers	7.4	12.2	5
Living conditions in hostel	12.4	22	7.5
Lack of personal interest in medicine	4.1	4.9	3.8
Adjustment to roommate(s)	11.6	17.1	8.8
Health			
Sleeping difficulties	10.7	12.2	10
Nutrition	19	26.8	15
Lack of exercise	22.3	24.4	21.3
Alcohol/drug abuse/smoking	0	0	0

PSS-14: Perceived Stress Scale-14

Table 3: Correlation between the severity of stress felt by various stressors and perceived stress score among the participants

Stressors	Spearman's rank correlation coefficient (<i>r</i>) of correlation between severity of stress felt by the stressor and PSS-14 score
Academic	
Frequency of examinations	0.123
Performance in examinations	0.387**
Academic curriculum	0.205*
Dissatisfaction with class lectures	0.335**
Nonavailability of adequate learning materials	0.279**
Becoming a doctor	0.176
Lack of time for recreation	0.266**
Competition with peers	0.257**
Lack of special guidance from faculty	0.163
Class attendance	0.27**
Difficulty reading textbooks	0.12
Psychosocial	
High parental expectations	0.183*
Loneliness	0.220*
Family problems	0.076
Accommodation away from home	0.002
Political situation in the country	0.057
Relations with opposite sex	0.132
Lack of entertainment in the institution	0.216*
Difficulty getting back home	0.159
Quality of food in the mess	0.155
Financial strain	0.226*
Inability to socialize with peers	0.155
Living conditions in hostel	0.208*
Lack of personal interest in medicine	0.16
Adjustment to roommate(s)	0.16
Health	
Sleeping difficulties	0.169
Nutrition	0.04
Lack of exercise	0.074
Alcohol/drug abuse/smoking	0.07

n=121, **Correlation is significant at the 0.01 level (two-tailed), *Correlation is significant at the 0.05 level (two-tailed). PSS-14: Perceived Stress Scale-14

Table 4: Correlation between Perceived Stress Scale-14 score and scores of components of the Pittsburgh Sleep Quality Index among the participants

Components of PSQI	Spearman's rank correlation coefficient (<i>r</i>) of correlation between PSS-14 score and the score of components of PSQI
Global PSQI score	0.370**
Subjective sleep quality	0.32**
Sleep latency	0.16
Sleep duration	0.32**
Habitual sleep efficiency	0
Sleep disturbance	0.14
Usage of sleep medication	0.14
Daytime dysfunction	0.22*

n=121, **Correlation is significant at the 0.01 level (two-tailed), *Correlation is significant at the 0.05 level (two-tailed). PSS-14: Perceived Stress Scale-14, PSQI: Pittsburgh Sleep Quality Index

Correlations between the PSS-14 score and the scores of components of the PSQI are noted in Table 4. There were positive correlations between perceived stress and the global PSQI score and the components of the PSQI,

including subjective sleep quality, sleep duration, and daytime dysfunction.

Table 5 shows a significant difference in the mean global PSQI score between subgroups based on the PSS-14 score.

DISCUSSION

Medical students undergo lot of stress in academics due to the huge curriculum and adjustments to the new environment at college. Various studies have reported stress among medical students at different phases of the medical course and during internships. The present study aimed to determine the extent of stress perceived among 1st-year medical students a few months after starting the course.

Brahmbhatt *et al.* reported that prevalence of stress among medical students ranged from 27% to 73% [6]. Wide variations in prevalence are due to different stress tools being applied and also the environment of the medical student. A total of 33.8% of the medical students had a PSS-14 score >28 in this study. The prevalence rate is low compared to other studies reporting perceived stress in India. This is due to lack of standard stratification of the perceived stress score. In earlier studies,

Table 5: Mean global Pittsburgh Sleep Quality Index score of subgroups based on Perceived Stress Scale-14 score

Subgroup based on PSS-14 score	Global PSQI score (mean±SD)
PSS-14 score ≤28 (n=80)	4.63±1.9
PSS-14 score >28 (n=41)	6.02±2.58

Student's unpaired *t*-test between subgroups *P*=0.0005. PSS-14: Perceived Stress Scale-14, PSQI: Pittsburgh Sleep Quality Index, SD: Standard deviation

perceived stress scores were divided into three categories. In this study, four categories were used, with scores in the upper two quartiles considered as stressed.

Some previous studies noted significant gender differences in perceived stress [15,18,19] while some did not [14,20,21]. There was no gender difference in this study although men seemed to be more susceptible to stress from various stressors.

A heavy curriculum, lack of time for recreation, frequency of examinations, performance in examinations, lack of entertainment in the institution, and quality of food in the mess were common academic and psychosocial stressors in the study group. Earlier studies have also noted these as stressors among medical students [17-19,22].

Students with higher perceived stress felt a lack of special guidance from faculty, dissatisfaction with class lectures, competition with peers, difficulty in getting back home, high parental expectations, nutrition problems, and lack of exercise as common academic psychosocial and health-related stressors, similar to previous studies [23-25]. Special care is required for these students at the earliest possible time. Teacher-student mentorship could help identify students with higher perceived stress and provide them with counseling to cope with stress.

The first phase of the medical course curriculum lasts 1 year. When there is a reduction in the duration from 1½ years to 1 year, the same curriculum should be covered in 9–10 months, with a corresponding increase in lecture class content. This affects the learning process, leading to dissatisfaction with class lectures. With the difficulty in coping with changes in living conditions, students feel that they have to visit their hometown frequently. However, with the increased distance from home, students feel stressed in getting back to their homes. They miss classes and feel the burden of making up for missed classes. Students feel a lack of time for extracurricular activities which psychologically affects them. Significant positive correlation between perceived stress by the students and the various attributed academic, psychosocial, and health-related stressors was noted in this study as in earlier studies [19,26].

The quality of sleep was also affected by the increase in perceived stress with significant deterioration of sleep quality in the subgroup with higher perceived stress. There was a significant positive correlation between perceived stress and the global PSQI score ($r = 0.39$). There was an insignificant correlation between sleeping difficulties and perceived stress. The students had no problem falling asleep soon after getting into bed, as measured by sleep latency. The other components of sleep quality, such as sleep duration, daytime dysfunction, and disturbed sleep, were affected, leading to significant association between perceived stress and sleep quality. Keeping pace

with lecture classes, fear of failure, and frequency of and performance in examinations could have reduced their sleep duration [15]. This led to daytime dysfunction affecting the learning process. A similar correlation was noted in a previous study [27].

Complications of stress such as depression, anxiety, and suicidal tendencies are on the rise. Early intervention for perceived stress will help in improving the general condition of medical students. Providing a stress-free environment could improve academic performance, reduce professional mistakes, and prevent the consequences of stress. In this regard, the Medical Council of India is suggesting reform in the curriculum wherein the 1st year of the medical course will be extended to 14 months. Changes in the method of assessment of academic performance, both in formative and summative assessments, are highly required for uniform assessment of all students.

CONCLUSION

New medical students are exposed to various stressors, consisting mostly of academic and psychosocial stressors. Stress, in turn, affects sleep quality. Deterioration in sleep quality affects general health. Hence, there is a need to address these stressors by student counseling, modifications in the teaching and evaluation systems, improving the living conditions of students, making them feel at home, and encouraging them to get involved in extracurricular activities such as sports and exercise, meditation, yoga, and music.

Limitations of the study

The study intended to note the various stressors and the perceived stress affecting sleep quality among 1st-year medical students. The study was done in one medical college. Hence, the sample size was small, limiting generalization of the results. The reasons why nonresponders did not participate were not assessed. Along with academic stressors, there were various psychosocial and health-related stressors which cause perceived stress among 1st-year medical students. A prospective study regarding the persistence of stressors for students and their effect on academic performance is required to make conclusions. A similar assessment is required in other colleges to compare and generalize the results to pave the way for reforms in the curriculum.

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Conflicts of interest

There are no conflicts of interest.

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